



STOW DMT Experiment



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Overview

- **Synthetic Theater of War (STOW)**

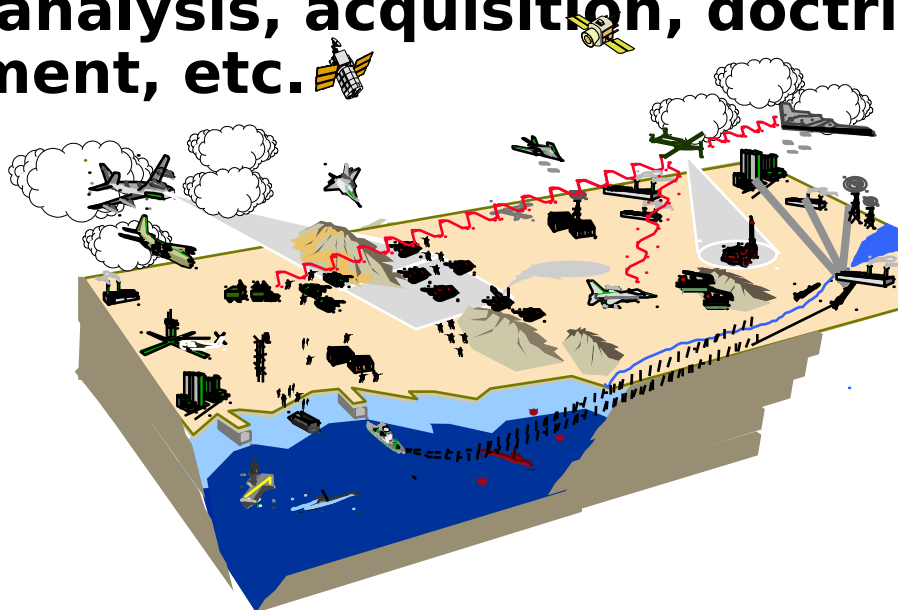
Capabilities

- **DMT Experiment with AFRL and ASC/YW**



Synthetic Theater of War

- **Develop technologies to:**
 - **Create a high fidelity seamless synthetic battlespace**
 - **Support training and mission rehearsal**
 - **Support analysis, acquisition, doctrine development, etc.**



**Leap Ahead in Simulation
Technology**



What is STOW?



- **Technologies integrated to create a JOINT SYNTHETIC BATTLESPACE**
 - **Discrete, Authoritative Models of Forces and Sensors**
 - **Realistic, Tactically Significant Environments**
 - **Composable, Open System Architecture**
 - **3-D Visualization**
 - **High Speed Data Networks**
 - **C4I Interfaces**



Synthetic Forces

Behaviorally accurate, intelligent, autonomous Forces and Sensors fully integrated into the Joint Synthetic Battlespace

- **Behaviorally Realistic Platforms (Tanks, Ships, Planes)**

- *Army Heavy Bde*
- *Navy CVBG / ARG*
- *Marine Expeditionary Force*
- *Air Force Composite Wing*
- *Opposing Forces*
- *UK Rapid Deployment Force*

- **Integrated Environmental Effects**

- **Realistic Sensor Performance**

- **Command Entities in Software**

- *Platoon, Company, Battalion Commander*
- *Command & Control Simulation Interface Language (CCSIL)*

- **Object Based Architecture/Modular Design**





Synthetic Environments



Integrated environmental models and databases to form a **Realistic, Tactically Significant Dynamic Battlespace.**

- **Multiple resolution terrain and bathymetric databases**
- **Tactically significant environmental effects**
- **Multi-state Objects (targets)**
- **Real-Time Weather**



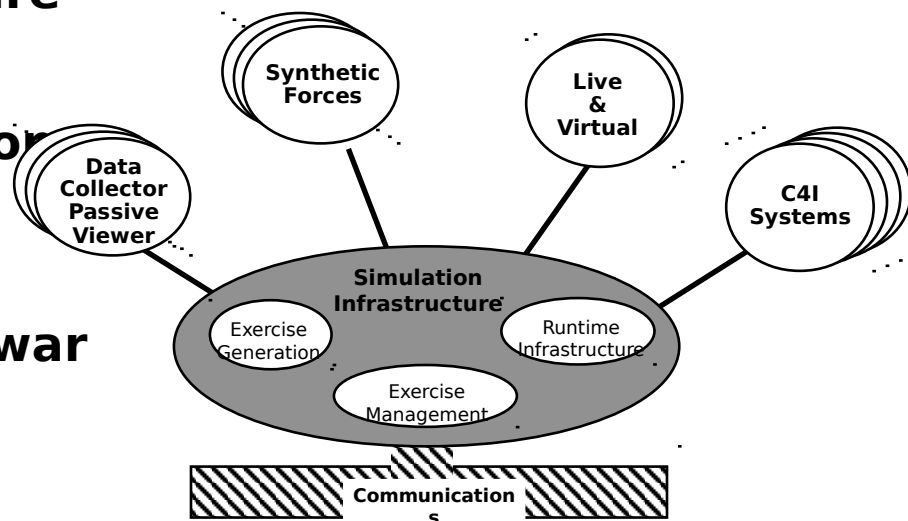


Simulation Infrastructure



Simulation management infrastructure that allows **multiple, geographically dispersed Live-Virtual-Constructive activities** to interact in a **Common Synthetic Battlespace**

- **Large scale High Level Architecture-compliant simulation framework.**
- **Capability for Seamless integration of:**
Live-Virtual-Constructive
- **Warfighters interface thru go-to-war systems.**
- **Access from warfighters location.**
- **Support for exercise planning and generation, simulation runtime, data collection and After Action Review**





STOW Summary



- **Fully interoperable entity level combat vehicle representations**
- **Increased validity of combat interactions**
 - *Capability to audit individual munitions from planning through employment*
- **Scaleable for individual, unit, component, and JTF level training**
- **Includes tactical level digital and voice C2**
- **Decreased resources (time, personnel, equipment)**



FY98 DMT Experiment

Objectives

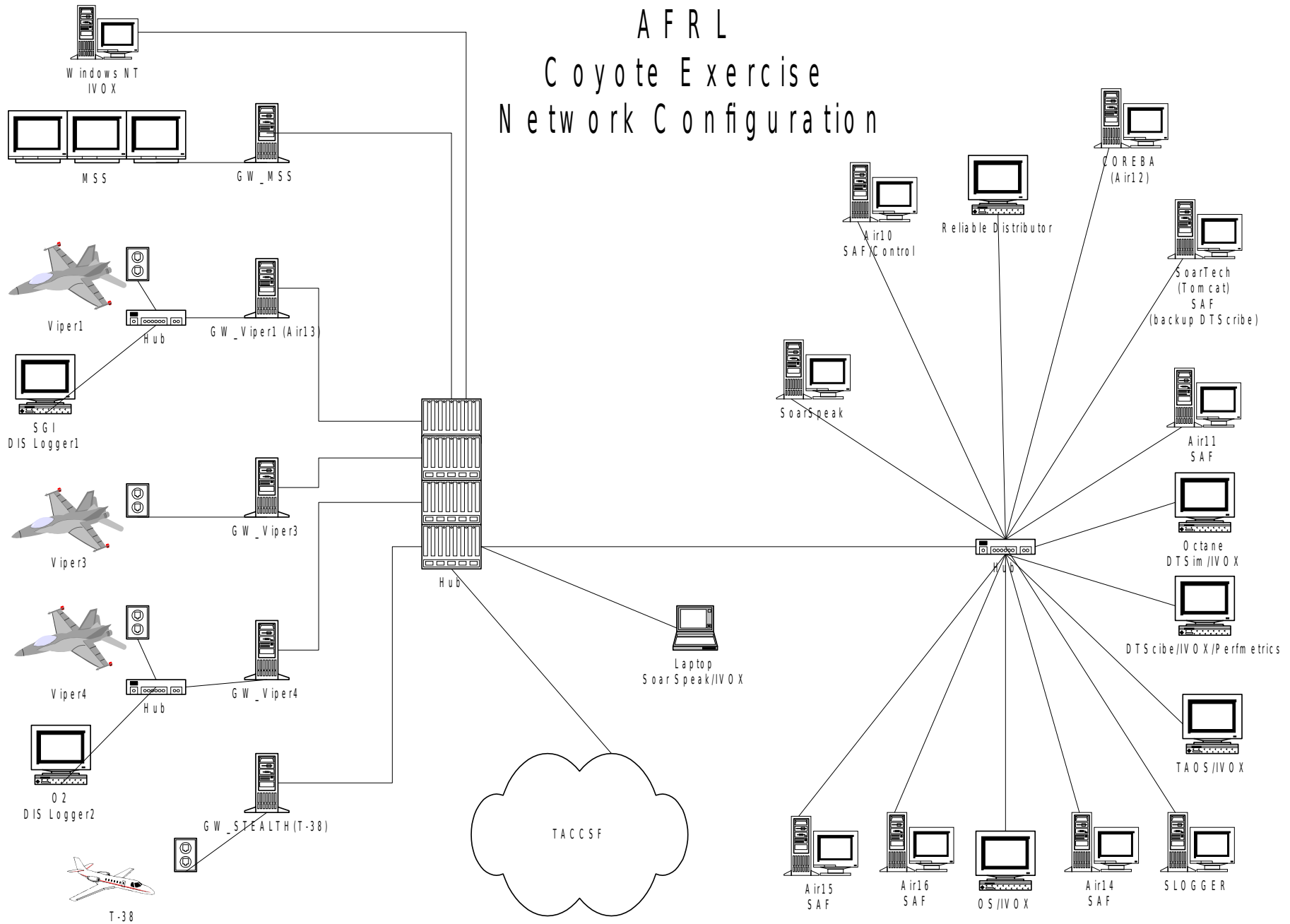
- **Integrate virtual simulators with the HLA compliant STOW synthetic battlespace**
 - *Distributed Data Management (DDM)*
 - *STOW Synthetic Environment for F-16 out-the-window imagery*
- **Demonstrate STOW Air Synthetic Force capability to support DMT-like training**
 - *Including human to synthetic communications*
- **Identify enhancements to virtual simulators and to STOW technologies for DMT development**
 - *To be done...*



DMT Experiment Approach

- **Integrate AFRL and TACCSF virtual simulators using HLA interfaces w/DDM**
 - *AFRL provides F-16 and A-10 simulators*
 - *TACCSF provides AWACS virtual simulator over existing T-1 WAN*
- **Instrument each network “layer” to determine actual cost in terms of latency compared to DIS**
- **Integrate STOW 3-D and SE applications with AFRL virtual simulators**

A F R L Coyote Exercise Network Configuration





DMT Experiment Products

- **HLA Interface**

- Links DIS compliant virtual simulators in STOW*
- Links virtual simulators in STOW including synthetic environments*
- Mailed one to Kelly AFB and they were part of Coyote testing*

- **Enhanced AirSF/Soar (JointSF)**

- Intelligent adversary and supporting forces*

- **SoarSpeak**

- Direct human to synthetic voice C2 (AWACS, E-2C, BFTT ATC/AIC training)*



STOW Coyote Applications

- **Joint Synthetic Forces (JointSF)**
 - *AirSF/Soar is the air component of JointSF*
- **Synthetic Environment**
 - *Weather*
 - *Battlefield Obscuration*
 - *Dynamic Terrain and Multi-State Objects*
- **AirSF/SOAR Exercise Editor (EE)**
- **Ordnance Server**
- **Simulation Execution Environment (SEE)**
- **PerfMETRICS**
- **IVOX Communication**



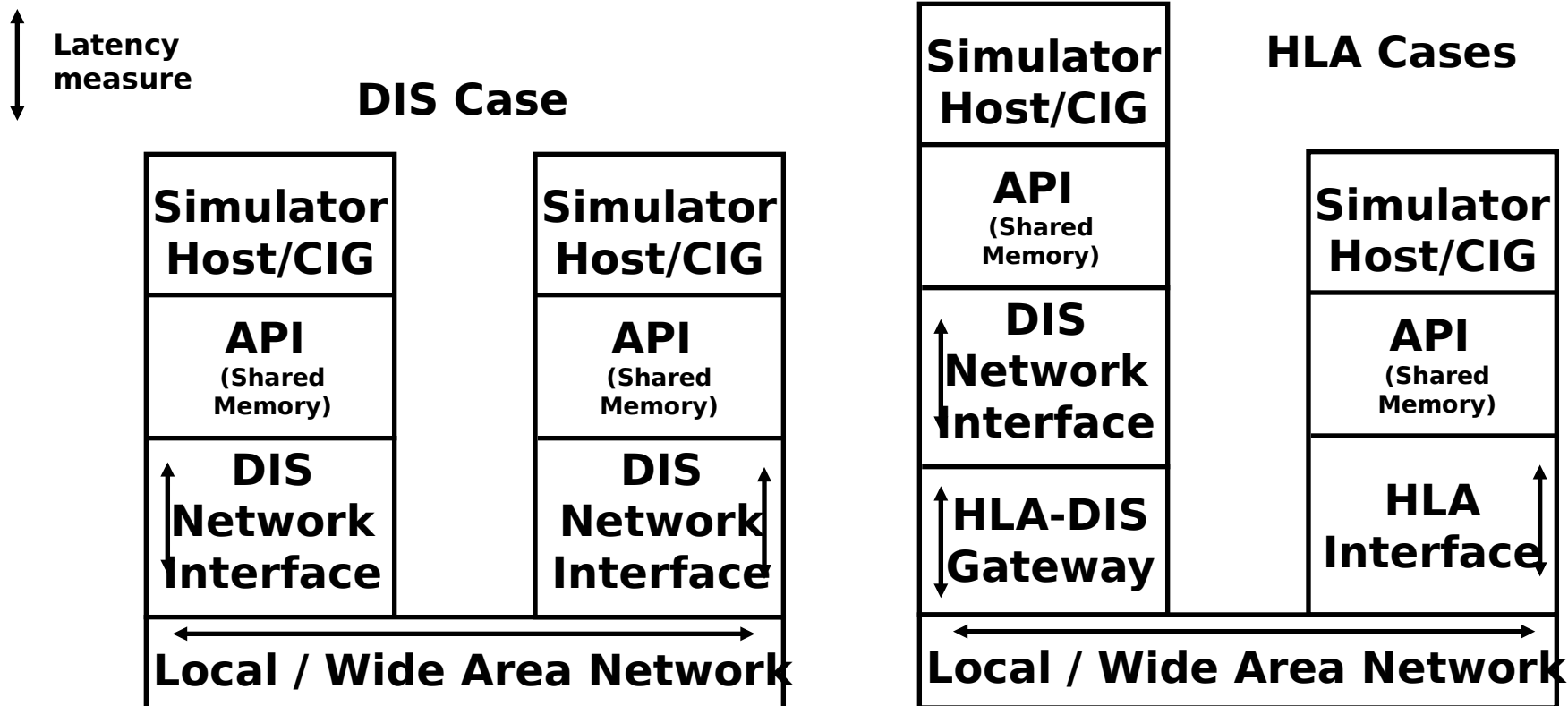
HLA Interface Latency Data

- **AFRL-TACCSF WAN latency varies from 11 - 19 msec**
- **STOW HLA Interface runs at 500 Hz**
 - *Tested at entity counts up to 512*
- **HLA Interface**
 - *Added latency for HLA-to-DIS layer is 1/2 millisecond*
 - *RTI-to-RTI LAN at AFRL end-to-end latency is 4-6 milliseconds*

Bottom Line: No discernible impact on quality of entity state representation between DIS and HLA in AFRL simulator visual displays



HLA Interface Latency Measurement



Hypotheses

- Cost to do HLA-DIS is minimal and offset by DDM as density increases.
- Cost for DIS and “native” HLA is similar for low density exercises.
- As density increases, HLA “keeps on going”, DIS dies